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Technical Memorandum

NUSCPLOT: A PROGRAM FOR PRODUCING NUSC VIEWGRAPHS AND REPORT ILLUSTRATIONS

VOLUME 1: USER'S GUIDE

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This document presents information concerning a new NUSC graphics resource for plotting view graphs and report figures in standard format. Potential application and benefits of using Program NUSCPLOT vl.O are outlined and examples are provided in Volume 1, along with information for users and a discussion of proposed upgrades. The appendices provide information on the files contained on the NUSCPLOT vl.O distribution disk, along with instructions for installing the program, building data files, for postprocessing output for reviewing, editing, and printing, and for reporting errors. Volume 2 provides a source-code listing.

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ABSTRACT

This document presents information concerning a new NUSC graphics resource for plotting viewgraphs and report figures in standard format. Potential application and benefits of using Program NUSCPLOT v1.0 are outlined and examples are provided in Volume 1, along with information for users and a discussion of proposed upgrades. The appendices provide information on the files contained on the NUSCPLOT v1.0 distribution disk, along with instructions for installing the program, building data files, for postprocessing output for reviewing, editing, and printing, and for reporting errors. Volume 2 provides a source-code listing.

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1 INTRODUCTION

NUSCPLOT is a FORTRAN-based stand-alone plotting program that produces color viewgraphs and report figures in standard NUSC format. This document outlines the release of NUSCPLOT v1.0 for use by NUSC personnel.

This section covers the usage, benefits, and capabilities of the program, presents a brief description of the graphical subprogram package MPLOT (which is the set of graphical primitives on which NUSCPLOT is based), and provides an overview of NUSCPLOT as related to other NUSC computer-aided engineering tools.

The remainder of the document describes the interactive options available to the user, provides examples showing the quality and versatility of the program, and discusses upgrades proposed for NUSCPLOT v2.0.

It is anticipated that this early version will require minor corrections. Your input is encouraged! A form for reporting errors or suggestions for improvement is provided as Appendix D. If you discover any errors with the program, please provide your comments in order to ensure that NUSCPLOT v1.1 will be as error free as possible.

Volume 2 of this document (NUSC TM 912146-2) lists the source code for NUSCPLOT v1.0.

1.1 Usage and benefits of NUSCPLOT

As a stand-alone program NUSCPLOT is intended for a variety of color or black-and-white plotting uses. These include development of presentation viewgraphs and report figures based on user-supplied data input via an ASCII standard data file.

The authors are currently developing a FORTRAN-callable subprogram-system version of the package (tentatively entitled NPLOT) that will allow users to build the plotting capability of NUSCPLOT into their own FORTRAN programs. It will provide a direct computation-to-presentation flow of information, eliminating time-consuming transfer of data between separate software packages, between computers, and between organizations within and outside of NUSC.

NUSCPLOT can operate in two basic modes-- viewgraph mode or figure mode. In viewgraph mode, standard NUSC banners (of any classification) are automatically generated, along with standard footers, which indicate user-specified information on filing, classification, and classification downgrading. In figure mode, the banner and footer are eliminated (although a classification label can be specified). In either mode, the output is automatically resized for the appropriate region on 8.5" x 11.0" media. Since the program is fully menu driven, most changes can be made with a few keystrokes. Details of these and other options are discussed in section 3.

1.2 MPLOT-based plotting with FORTRAN

One of the most useful characteristics of the NUSCPLOT system is its portability. The portability of any software system is limited by the standards to which it adheres, and to the portability of any software libraries that it references. During the development of NUSCPLOT v1.0, efforts were made to adhere to the ANSI FORTRAN 77 standard.

Portability of the graphical output, on the other hand, has been achieved by application of the MPLOT Graphical Subprogram Package, v3.0. This software package has been under development by the Department of Naval Architecture and Marine Engineering of The University of Michigan since 1982. MPLOT graphics drivers exist for a variety of machines, including the entire Macintosh line, APOLLOs, CRAYs, and any workstation or personal computer running Xwindows (itself a well-established standard), including SUNs. An MPLOT v2.0 exists for the IBM PC/XT/AT line (and compatibles), and the v3.0 driver is currently under development.

MPLOT thus represents an inexpensive, versatile, well-organized set of graphical primitives that allows the programmer to develop simple graphics applications without the necessity of performing tedious graphical format transformations when transferring a FORTRAN application to another platform, or even restricting his or her development to equipment of a particular vendor. With such a set of primitives, the portability and versatility of NUSCPLOT have been ensured.

1.3 Interaction with other NUSC software

A schematic of the information flow associated with NUSCPLOT is shown in figure 1. The stand-alone executive program is represented by the box labeled "PROGRAM NUSCPLOT" in the upper left-hand corner. As is indicated, the program accesses various subroutines that allow the user to set options and to input and output textual and graphical data.

The FORTRAN-callable subprogram-system version of NUSCPLOT (currently under development) is represented in figure 1 as the single box labeled "SUBPROGRAM NPLOT". As is indicated, this system can be accessed by any FORTRAN application running on any computer supplied with an MPLOT driver.

Also shown in figure 1 are proposed data paths between the NUSCPLOT system and various commercially-available software packages such as CricketGraph™ or Excel™.

Finally, figure 1 also schematizes the interaction between the NUSCPLOT and MPLOT systems, including the various metafile postprocessors available with MPLOT. The process of saving NUSCPLOT output in a metafile is discussed in section 2. Instructions for postprocessing metafiles are included in Appendix C.

One of the available metafile processors available with MPLOT is entitled MetPic. This processor allows an MPLOT metafile to be converted to the "PICT" format, which can be imported to various commercially-available stand-alone graphics packages, including MacDraft™ and MacDraw II™. Translators exist for converting PICT-formatted files to functionally-equivalent IBM formats, for example, the MacLink™ plus TOPS™ system, which results in PC Paintbrush™-formatted files.

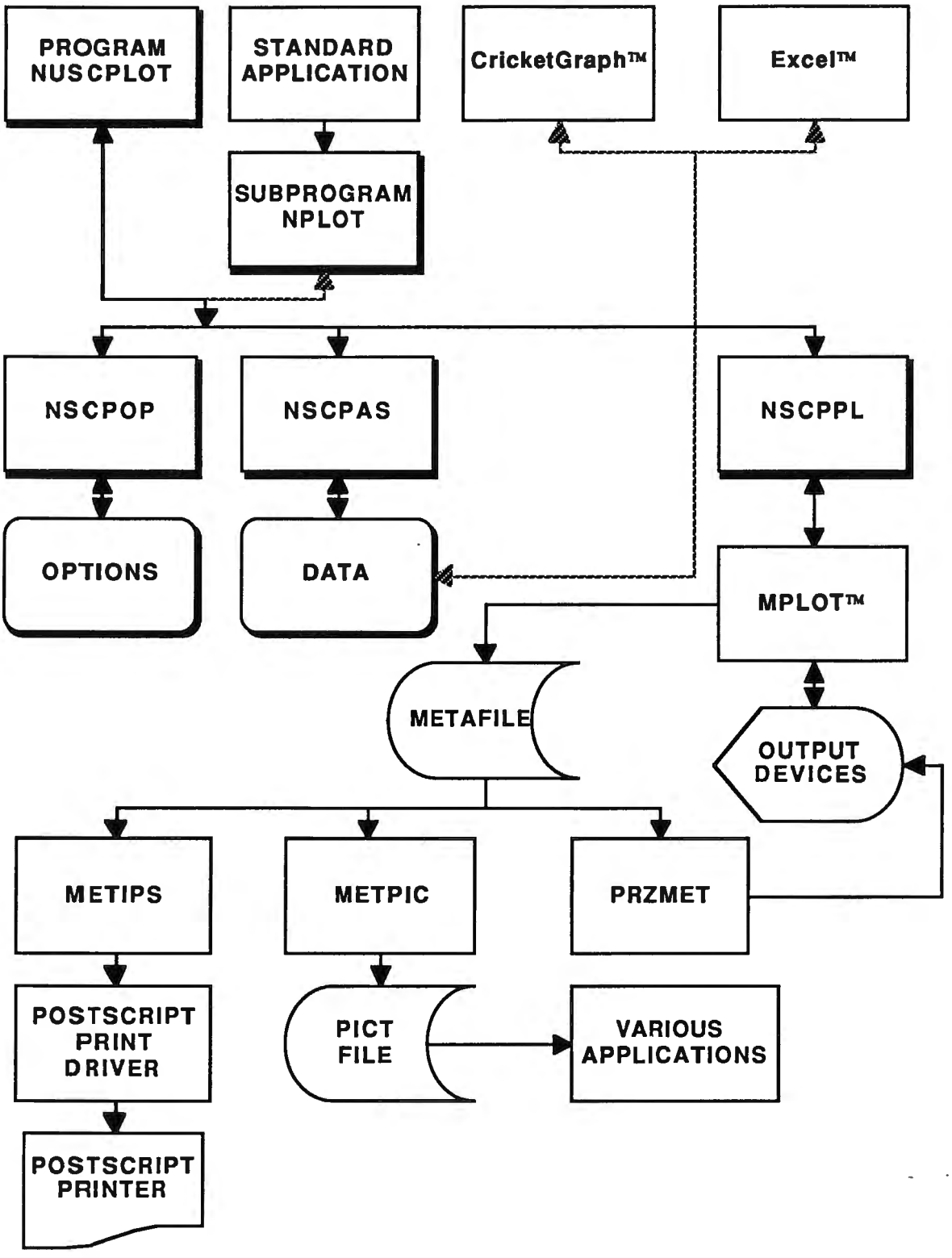

Figure 1: Interaction of NUSCPLOT system with other NUSC software

2 EXAMPLES

2.1 Basic NUSCPLOT output using Metips

Figure 2 shows typical output from NUSCPLOT to a Tektronix Phaser™ IIsx color printer via the Metips metafile processor. This figure represents output in viewgraph mode (that is, with banner and footer included). The printed image has been reduced on a Canon™ color copier in order to maintain a border in this technical memorandum: The size of the original image meets NUSC standards for viewgraphs.

The classification indicator in the banner can be suppressed if the viewgraph is unclassified. Up to three title lines are permitted. The user can specify both a file reference and a classification downgrading statement in the footer. The user has complete control over the abscissa and ordinate labels, although standard labels can be specified using the program menus. Various scale types may be specified for either axis, as is described in section 2; the abscissa shown in figure 2 was produced using the ANSI 1/3-octave band specification.

The user also has control over the endpoints of each axis, although NUSCPLOT will choose aesthetic endpoints and tick spacing by default. Options that allow the user to specify a 70 unit range for the ordinate and a 40 unit - 40,000 unit range for the abscissa have been included. In conjunction with the page layout built into the program, these specifications allow simple production of standard viewgraphs or figures for presenting typical spectral data. A future version of NUSCPLOT will allow tick labels to be replaced with references.

A report figure could have been generated using the same input with other options selected via the interactive menus. The figure representing the equivalent of the viewgraph shown in figure 2 would be similar, except that the banner and footer would be suppressed.

2.2 PICT file produced using MetPic, imported to MacDraw II

Figure 3 is an example of the same NUSCPLOT metafile processed with the MetPic processor. The resulting file was imported to MacDraw II™, printed to the Phaser IIsx™, and reduced on the Canon™ color copier. The figure could also have been imported to MacDraft™ or any one of a number of other commercially-available graphics packages. Once imported to such a program, other similar imports could be added, changes made, labels rearranged, et cetera.

2.3 PICT file with edited fonts

While the viewgraph of figure 2 is entirely suitable for dry runs and many in-house presentations, the user might desire to improve the quality of the fonts. Notice that the fonts in the PICT-file representation of figure 3 are even worse. This is due to the fact that characters in MPLOT are produced using line-draw commands.

The fonts can be significantly improved by simply replacing each text string with suitable hardware fonts available in the commercially-available software packages. The results of making such changes are shown in figure 4. In this figure, all text strings *except the axis and legend labels* have been replaced with Helvetica fonts of the nearest size. For the figure shown, this process took less than five minutes; replacing the axis and legend labels would

probably have taken about another five minutes. The quality of the slide is much-improved over the examples shown in figures 2 and 3.

2.4 Classified output

As was mentioned previously, NUSCPLOT has the capability of producing classified output. *It is the responsibility of the user to ensure that all use of NUSCPLOT adheres to Department of Defense security regulations and NUSC security policy, including restriction of classified data to certified classified computers.*

An unclassified example of the framework of a confidential viewgraph is shown in figure 5. The banner color is altered automatically upon respecification of the classification option. The user has control over the downgrading statement included in the footer. The downgrading statement should be chosen in accordance with all relevant security guidelines.

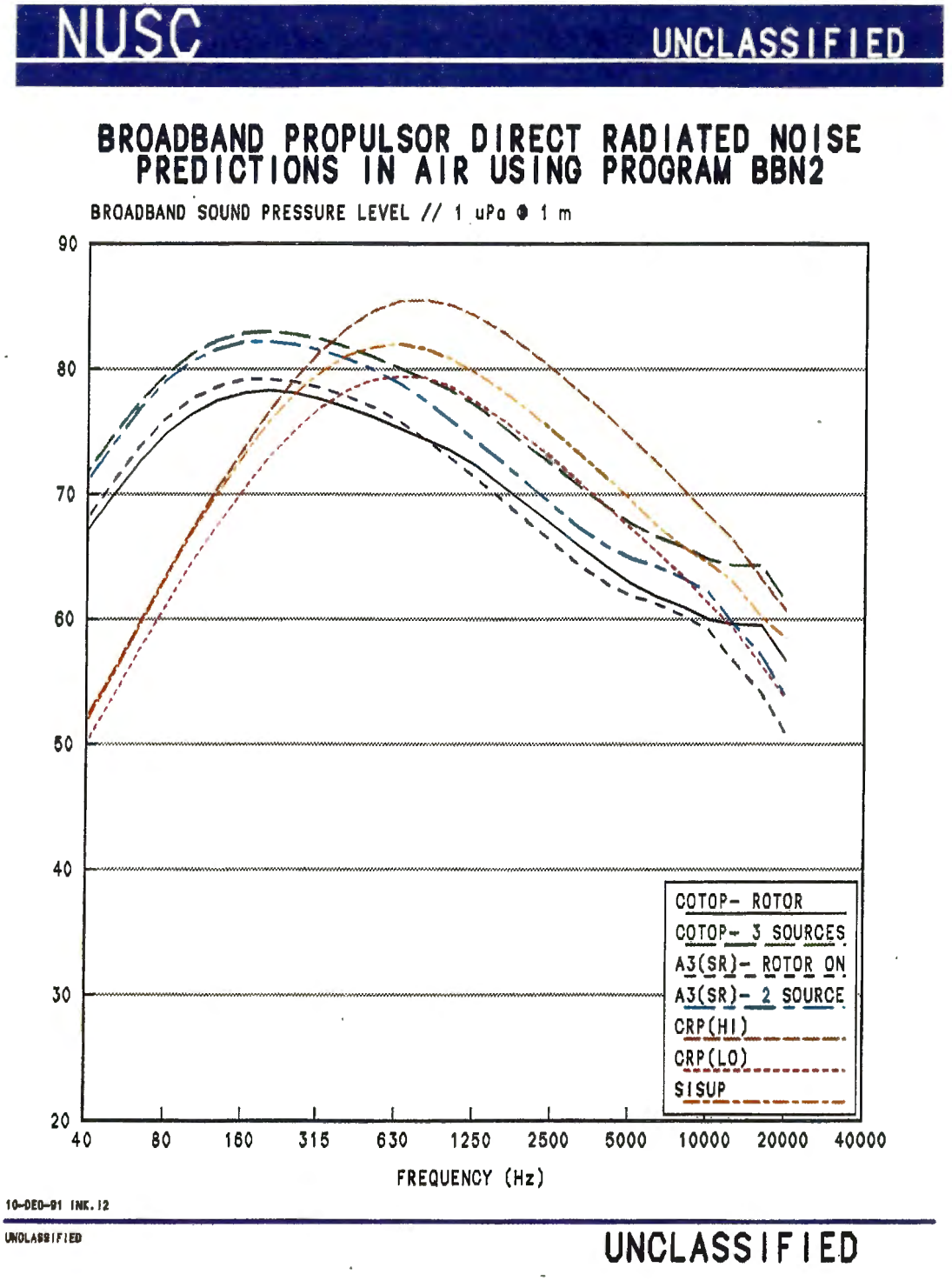

Figure 2: Basic NUSCPLOT output using Metips

Reverse Blank

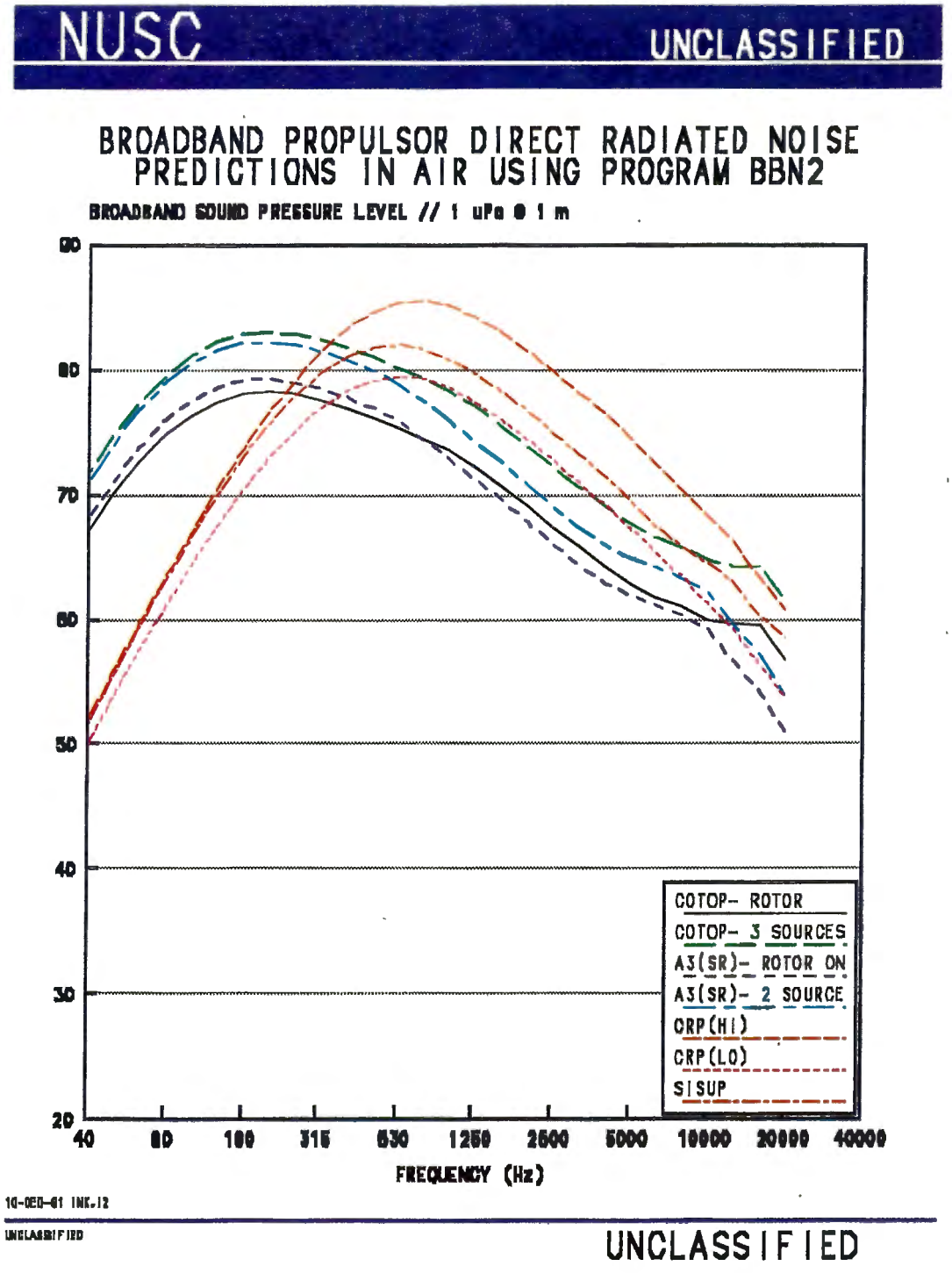

Figure 3: PICT file produced using MetPic, imported to MacDraw II™ (no editing)

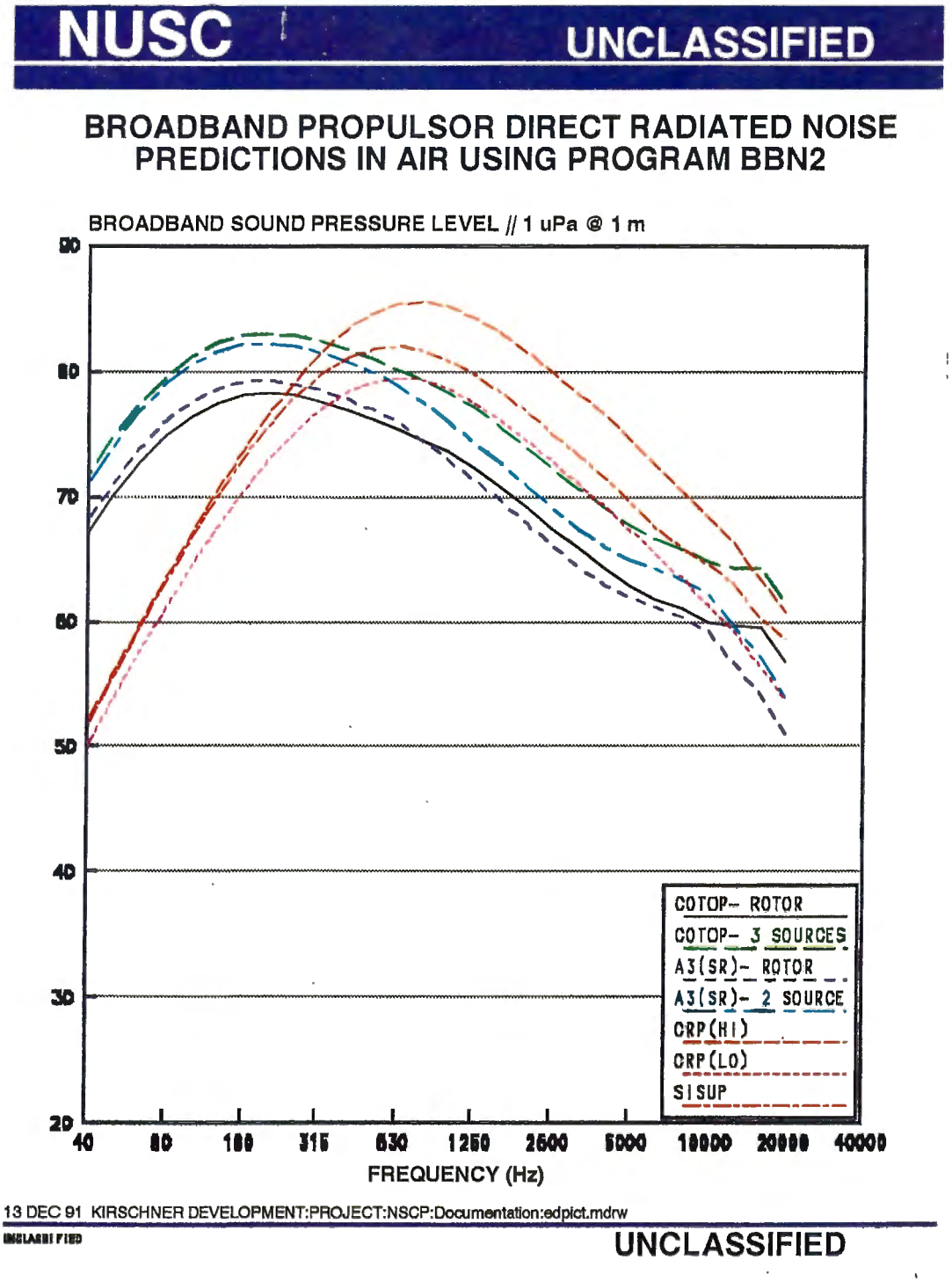

Figure 4: PICT file imported to MacDraw II™ with fonts partially edited

Reverse Blank

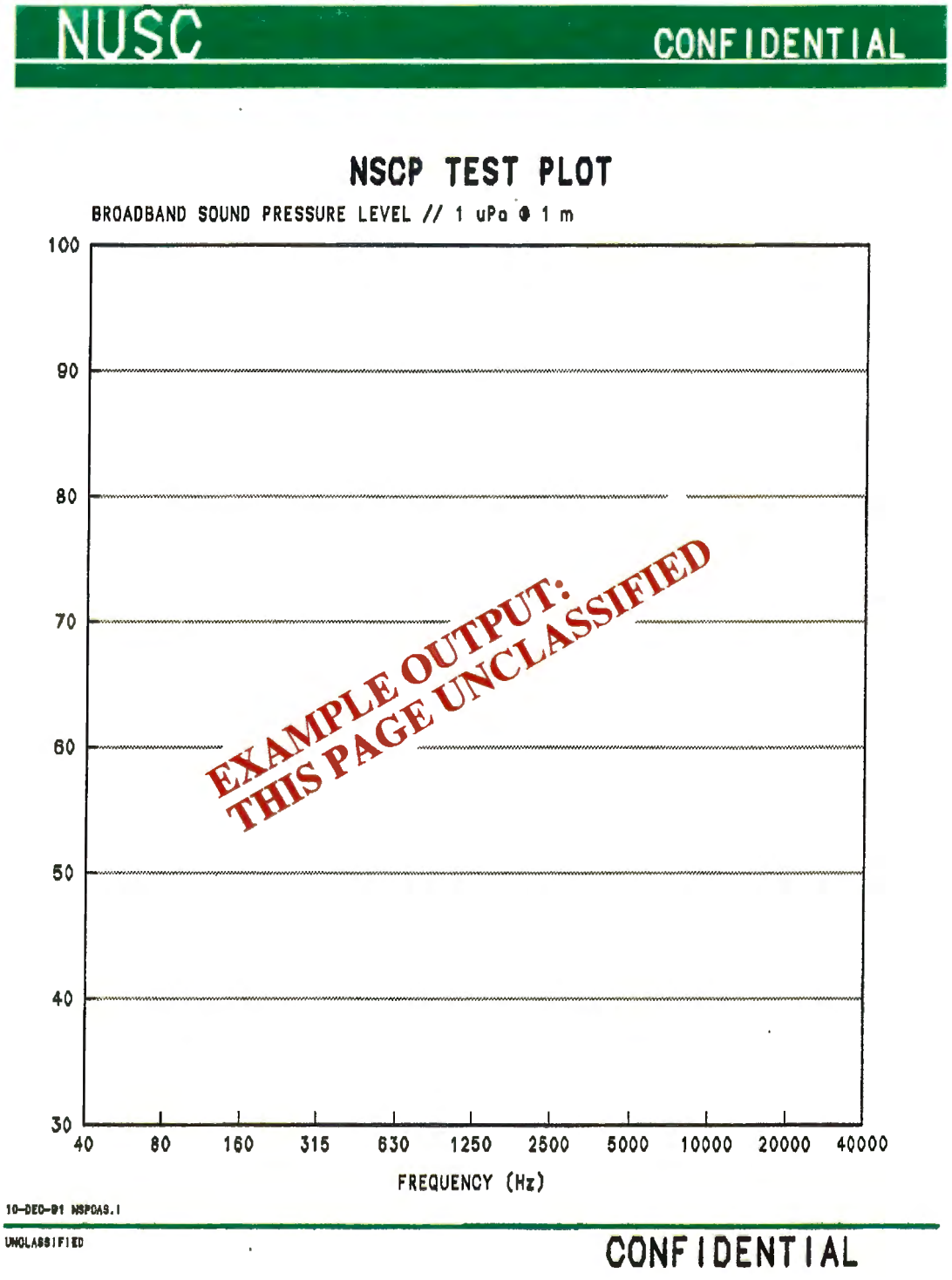

Figure 5: Unclassified example of framework for confidential viewgraph

3 INTERACTIVE OPTIONS

The main menu options are summarized table 1:

Table 1: Main menu.

Index	Option
1	Exit Program
2	Read Data
3	Save Data
4	Set Options
5	Generate Plot
6	Save Plot

When the program is started, only the Exit Program and Read Data options are available. After a data file has been read, the other options appear. After an option has been completed, the program returns to this main menu.

Complete descriptions of each option are given below in separate subsections.

3.1 Exit Program

As one might imagine, NUSCPLOT is terminated using this option. Before invoking it, the user should save any changes to the output format by using the Save Data option (see section 3.3).

3.2 Read Data

Read a text data file. This file contains data points to be plotted as well as information that determines how the plot will appear. A full description of the format of a data file is given in Appendix B.

3.3 Save Data

Save the current data points and output format into a text data file that is capable of being processed by a subsequent Read Data option. The format of the data file is presented in Appendix B.

3.4 Set Options

Plot labels and scales are modified using this option. Modifications are accomplished by the use of additional three additional menu levels. The first level is given in table 2:

Table 2: Set Options menu.

Index	Option	Index	Option
1	Reset Default Options	4	Read Options
2	Customize Options	5	Exit Menu
3	Save Options		

The default output format options are those that are in place when the program is started. They are altered by the Customize Options selection. The Save Options and Read Options selections have not been implemented in NUSCPLOT v1.0.

The Customize Options menu and submenus are given in table 3. More detailed descriptions are provided in subsequent subsections.

3.4.1 Output Format

This option allows a choice of output formats. One is appropriate for figures included in reports; the other is for viewgraphs.

3.4.2 Classification

Allows a choice of standard classification banner labels and colors or a user-specified label.

3.4.3 Ordinate: Spectrum Type

The ordinate (vertical) axis label is a concatenation of four strings:

1 Spectrum type, `ST`;
2 Spectrum quantity, `SQ`;
3 Reference units, `RU`; and,
4 Datum distance, `DD`.

These strings are modified using this and the following three options. Several standard strings are provided as different suboptions. They appear together immediately above the plot as:

```
ST SQ // RU @ DD
```

The strings `//` and `@` automatically precede any user-specified `RU` and `DD`, respectively. If the "(none)" suboption is chosen, these extra strings do not appear. Therefore, the recommended way to specify a completely user-defined ordinate axis label is to set spectrum type, reference units and datum distance to "(none)" and specify an appropriate reference unit string.

3.4.4 Ordinate: Quantity

See section 3.4.3. The choice of suboption may override the currently selected reference units and datum distance.

3.4.5 Ordinate: Reference

See section 3.4.3. The choice of suboption may override the currently selected datum distance.

3.4.6 Ordinate: Distance

See section 3.4.3.

Table 3: Customize Options menu.

Index	Option	Suboptions
1	Output Format	1 Figure (no banner) 2 Viewgraph (NUSC banner)
2	Classification	1 Unclassified 2 Confidential 3 Secret 4 (user-specified)
3	Ordinate: Spectrum Type	1 Narrowband 2 1/3 Octave Band 3 (user-specified) 4 (none)
4	Ordinate: Quantity	1 Sound Power Level 2 Sound Pressure Level 3 (user-specified) 4 (none)
5	Ordinate: Reference	1 1 pW 2 1 µPa 3 (user-specified) 4 (none)
6	Ordinate: Distance	1 (none) 2 1 m 3 1 yd 4 (user-specified)
7	Ordinate: Labels	1 Labeled 2 Referenced
8	Ordinate: Scale	1 Linear Scale 2 Logarithmic Scale 3 ANSI Standard "2^(1/3):1" Scale
9	Abscissa: Quantity	1 Frequency (Hz) 2 (user-specified) 3 (none)
10	Abscissa: Scale	1 Linear Scale 2 Logarithmic Scale 3 ANSI Standard "2^(1/3):1" Scale
11	Goal	1 (none) 2 CCAPS (not yet implemented)
12	Domain	1 (automatic) 2 40 - 40 K, ANSI Standard "2^(1/3):1" Scale 3 (user-specified)
13	Range	1 (automatic) 2 70 units, Linear Scale 3 (user-specified)
14	Legend	1 Upper-right 2 Lower-right 3 Upper-left 4 Lower-left 5 No Legend
15	Exit Menu	

3.4.7 Ordinate: Labels

This option (not yet implemented) will give the user the ability to replace the ordinate axis tick labels with a reference string.

3.4.8 Ordinate: Scale

The scale of the ordinate axis is specified as either:

1 Linear;
2 Logarithmic; or,
3 The ANSI standard "2^(1/3):1" scale.

This choice may be overridden by the Domain option (see section 3.4.12).

3.4.9 Abscissa: Quantity

This option is the means of specifying the abscissa (horizontal) axis label.

3.4.10 Abscissa: Scale

The scale of the ordinate axis is specified as either:

1 Linear;
2 Logarithmic; or,
3 The ANSI standard "2^(1/3):1" scale.

This choice may be overridden by the Range option (see section 3.4.13).

3.4.11 Goal

This option (not yet implemented) will permit the user to superimpose a noise goal curve on the plotted data.

3.4.12 Domain

The vertical extents of the plot in data units are determined in this option. These extents may be selected automatically (all data are accommodated and ticks are spaced aesthetically) or overridden by the user.

3.4.13 Range

The horizontal extents of the plot in data units are determined in this option. These extents may be selected automatically (all data are accommodated and ticks are spaced aesthetically) or overridden by the user.

3.4.14 Legend

This option controls the placement of the plot legend.

3.4.15 Exit Menu

Returns control to the preceding Set Options menu.

3.5 Generate Plot

Plot the current data file using the selected scales, labels, and other options.

The plot that appears is the largest that can fit on the screen while still maintaining an aspect ratio of 8.5:11.0. The plot is completed when the cursor reappears. To continue, click the mouse once or press any key.

3.6 Save Plot

Generate an MPLOT metafile.

After choosing this option, the user is prompted for a "metafile number". The program then creates a text file. This file may then be processed further by a number of other applications. An outline of the operation of these programs is presented in Appendix C.

4 PROPOSED UPGRADES

In addition to user control of tick labeling proposed for NUSCPLOT v2.0, various other upgrades are anticipated, including the capability of importing and exporting tab-delimited text for use with CricketGraph™ and Excel™. Another anticipated upgrade will allow users to save the options settings in order to template viewgraphs and figures for consistent appearance throughout a presentation or report.

MPLOT also has hatching capability, in addition to the fill-area capability exemplified by the banners shown in the previous figures. This raises the possibility of plotting error bands. It would also be useful to have the capability of tagging tonal spectral values over broadband spectra. Another anticipated upgrade would allow rendering of surfaces for representation of vehicle and propulsor geometries.

Another upgrade planned for NUSCPLOT v2.0 will be the removal of some of the cumbersome menuing by providing a library of standard plot types, such as spectrum, line graph, et cetera. This library will also allow wireframe or shaded representation of surfaces, such as NUSC vehicles, fins, and propulsor components.

Once again, the reader's input is solicited. Feel free to list your particular needs and comments and submit them on the form provided in Appendix D.

APPENDIX A: DISTRIBUTION DISK AND PROGRAM INSTALLATION

The NUSCPLOT v1.0 distribution disk contains the following files:

NUSCPLOT: The executable file that allows production of basic NUSCPLOT output to the screen or to MPLOT metafiles for postprocessing with the various MPLOT metafile processors

sample.i: The input data used to produce many of the figures appearing in this document

Przmet: Allows the user to review an MPLOT metafile on the screen

Metips: Allows conversion of an MPLOT metafile to PostScript for outputting on any PostScript device, including LaserWriter printers

MetPic: Allows conversion of an MPLOT metafile to a PICT-formatted file

SendPS™: Allows a PostScript file (for example, the output from Metips) to be output on a PostScript printer

The following steps are recommended for installing the NUSCPLOT system and the related applications on a Macintosh personal computer:

1 Create a new folder on your Macintosh hard disk. It is suggested that the folder be entitled NUSCPLOT, and be located in your applications folder;

2 Copy the contents of the NUSCPLOT v1.0 distribution disk to the new NUSCPLOT folder on your hard disk;

3 Open the NUSCPLOT application by double-clicking its icon;

4 Request item 2, "READ DATA", at the first menu prompt;

5 Request item 1, "NUSCPLOT STANDARD ASCII FILE";

6 Respond to the filename prompt by typing "sample.i";

7 Request item 5, "GENERATE PLOT".

If a plot appears on the screen, the NUSCPLOT installation was successful. Program operation continues as follows:

8 Strike the return key to return to the menu system;

9 Use the menus to reset options, to save the plot, to save the data in another file, or to exit the program.

APPENDIX B: DATA FILE SPECIFICATIONS

The format of the text file read or created by NUSCPLOT is described in tables B-1 through B-3. **Important:** Blank lines are significant and must be included where indicated.

Table B-1: Data file format, part 1.

Number of Lines	Line Type	Description
>=0	Comment	A comment line may consist of any text as long as it does not start with the string "NUSCPLOT V". The NUSCPLOT standard output file begins with a header, which can be treated as a set of comments.
1	Identifier	Identifies the text file as a NUSCPLOT data file; it consists of the text : "NUSCPLOT Vxx.xx" where xx.xx is the version number of the data file. Data file versions are only upwardly compatible with program versions; that is, data files can only be processed by a NUSCPLOT program of equal or greater version number.
1	Blank	
2	References	These are the two strings that are part of the footer in the viewgraph output format option. It is recomended that the first be used as a file identifier, so that viewgraphs can be recovered, and that the second be used as a classification downgrading statement.
1	Blank	
1	Number input	Number of title lines, NT; 0 <= NT <= 3.
NT	Text	Title lines 1 through NT, inclusive.
1	Blank	
1	Number input	Number of curves, NL; 0 <= NL <= 8.
1	Blank	

The following set of data file lines is then repeated NL times:

Table B-2: Data file format, part 2.

Number of Lines	Line Type	Description
1	Text	Curve label, up to 16 characters (extra characters are truncated).
1	Blank	
1	Number input	First index M and last index N of the array of data points that defines the curve.
1	Comment	Any text.
N-M+1	Number input	X(I) and Y(I), the horizontal and vertical coordinates respectively of the Ith data point, where I varies from N to M.
1	Blank	

After the last curve, it is optional for an input file to have any combination of the following lines in any order:

Table B-3: Data file format, part 3.

Number of Lines	Line Type	Description
1	Label input	Specify ordinate spectrum type. The line must begin: "ORD:SPECTYPE " followed by the new ordinate spectral type.
1	Label input	Specify ordinate spectrum quantity. The line must begin: "ORD:QUANTITY " followed by the new ordinate spectrum quantity.
1	Label input	Specify ordinate reference units. The line must begin: "ORD:REFERENC " followed by the new ordinate reference units.
1	Label input	Specify ordinate datum distance. The line must begin: "ORD:DISTANCE " followed by the new ordinate datum distance.
1	Label input	Specify abscissa axis label. The line must begin: "ORD:QUANTITY " followed by the new abscissa axis label.

What follows are significant portions of the sample data file, sample.i. Some data points have been removed and replaced by ellipses.

```
**************************************************
*                                                *
*       NUSCPLOT:  STANDARD DATA PRESENTATION    *
*                                                *
*------------------------------------------------*
*                                                *
*      COPYRIGHT (C) 1991:  NUSC-NPT Code 804    *
*                           Dr. I.N. Kirschner   *
*                           Mr. W.P. Krol        *
*                                                *
**************************************************
NUSCPLOT V 1.00

10-DEC-91 INK.I2
UNCLASSIFIED

             2 NUMBER OF TITLE LINES
BROADBAND PROPULSOR DIRECT RADIATED NOISE
PREDICTIONS IN AIR USING PROGRAM BBN2

             7 NL:  NUMBER OF CURVES

COTOP- ROTOR

      1     34 CURVE COORDINATES
       XP              YP
  1.0000000E+01  4.2800000E+01
  1.2500000E+01  4.7100000E+01
  1.6000000E+01  5.1700000E+01
  2.0000000E+01  5.5800000E+01
  2.5000000E+01  5.9600000E+01
  3.1500000E+01  6.3400001E+01
  4.0000000E+01  6.7000000E+01
  5.0000000E+01  6.9900001E+01
  6.3000000E+01  7.2600000E+01
```

```
  8.0000000E+01  7.4900001E+01
  1.0000000E+02  7.6400001E+01
  1.2500000E+02  7.7500000E+01
  1.6000000E+02  7.8100000E+01
  2.0000000E+02  7.8300003E+01
  2.5000000E+02  7.8100000E+01
  3.1500000E+02  7.7600000E+01
  4.0000000E+02  7.6900001E+01
  5.0000000E+02  7.6200000E+01
  6.3000000E+02  7.5300003E+01
  8.0000000E+02  7.4400001E+01
  1.0000000E+03  7.3500000E+01
  1.2500000E+03  7.2300003E+01
  1.6000000E+03  7.0600000E+01
  2.0000000E+03  6.9100000E+01
  2.5000000E+03  6.7500000E+01
  3.1500000E+03  6.5900001E+01
  4.0000000E+03  6.4300003E+01
  5.0000000E+03  6.2900001E+01
  6.3000000E+03  6.1800000E+01
  8.0000000E+03  6.1000000E+01
  1.0000000E+04  6.0000000E+01
  1.2500000E+04  5.9600000E+01
  1.6000000E+04  5.9500000E+01
  2.0000000E+04  5.6700000E+01

COTOP- 3 SOURCES

      1     34 CURVE COORDINATES
       XP             YP
  1.0000000E+01  4.7600000E+01
  1.2500000E+01  5.1900001E+01
        :              :
        :              :
  1.6000000E+04  6.4300003E+01
  2.0000000E+04  6.1400001E+01

A3(SR)- ROTOR ON

      1     34 CURVE COORDINATES
       XP             YP
  1.0000000E+01  4.3100000E+01
  1.2500000E+01  4.7400001E+01
        :              :
        :              :
  1.6000000E+04  5.4100000E+01
  2.0000000E+04  5.0900001E+01

A3(SR)- 2 SOURCE

      1     34 CURVE COORDINATES
       XP             YP
  1.0000000E+01  4.6100000E+01
  1.2500000E+01  5.0400001E+01
        :              :
        :              :
  1.6000000E+04  5.7100000E+01
  2.0000000E+04  5.3900001E+01

CRP(HI)

      1     34 CURVE COORDINATES
       XP             YP
  1.0000000E+01  3.4700000E+01
  1.2500000E+01  3.6300000E+01
        :              :
        :              :
  1.6000000E+04  6.3200000E+01
  2.0000000E+04  6.0700000E+01

CRP(LO)
```

```
     1     34 CURVE COORDINATES
      XP             YP
  1.00O0000E+01  2.9800000E+01
  1.25O0000E+01  3.2000000E+01
        :              :
        :              :
  1.60O0000E+04  5.6300000E+01
  2.00O0000E+04  5.3700000E+01

SISUP

     1     34 CURVE COORDINATES
      XP             YP
  1.00O0000E+01  3.2300000E+01
  1.25O0000E+01  3.4200000E+01
        :              :
        :              :
  1.60O0000E+04  6.0200000E+01
  2.00O0000E+04  5.8500000E+01

ORD:SPECTYPE BROADBAND
ORD:QUANTITY SOUND PRESSURE LEVEL
ORD:REFERENC // 1 uPa
ORD:DISTANCE @ 1 m
ABS:QUANTITY FREQUENCY (Hz)
```

APPENDIX C: POSTPROCESSING MPLOT METAFILES

The metafile processors provided with MPLOT have been included on the NUSCPLOT distribution disk. The application SendPS™ is also provided, in accordance with its distribution statement.

Each of the MPLOT metafile processors is driven by a self-explanatory menuing system. Copies of the MPLOT documentation (including that associated with the metafile processors) can be borrowed for review from the authors of this document.

These applications include:

- **Przmet**
  Allows previewing of the metafile before printing, including the ability to zoom in on any portion of the display.

- **Metips**
  Convert the metafile into a PostScript file, which can then be printed on the LaserWriter or other PostScript-compatible printer by such applications as SendPS™ or Freedom of Press®.

- **MetPic**
  Convert the metafile to a PICT format, rendering it capable of being read by Macintosh CAD and word processing programs.

- **SendPS™**
  Downloads a PostScript text file (such as the ones created by Metips) to a Postscript-compatible printer.

APPENDIX D: ERROR REPORTING

Problems with Program NUSCPLOT and suggestions for improvements should be reported to either :

Ivan N. Kirschner or William P. Krol Jr.
Building 108
NUSC-804
Newport, RI 02841-5047

Phone: (401)841-3546 Fax: (401)841-7012

Program version: 1.00 Computer/Monitor Model:

Description of bug (be precise, give details on when the error occurs and how to reproduce it. Include sample of input and output if appropriate):

Suggestions for enhancements/improvements:

Your name, address, and telephone and FAX numbers:

NAME:	
ADDRESS:	
Phone: ( ) -	FAX: ( ) -

Distribution

Codes	0212	
	025	(W. Golembewski, C. Rousseau)
	0261	
	0262	(2)
	02244	
	22	
	38	
	3891	
	81	
	83	
	804	(J. Meng, C. Egan, P. Hendricks, M. Keshura, S. Tucker, J. Uhlman, C. Marsh, I. Kirschner, W. Krol)
	8122	(T. Davis, J. Hanson)
	8214	(S. Dickinson, C. Beauchamp, D. Brown)
	8215	(B. Sandman, P. Corriveau, B. Gauthier)
Total:	29	